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Pasadena, California



Channel Recovery Results

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G&C Table Overview



- AIRS has 2378 IR channels, of which the 2104 photovoltaic (PV) channels have two detectors which can be used singly, or in combination.
- The combination of the A & B detectors is weighted to optimize channel performance (A, B, or A+B). These weights are set in the “Gain & Circumvention (G&C)” Table.
- Radiation circumvention thresholds are also set on a per detector basis in the G&C table for each of the 2104 PV channels.



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G&C Table A/B Optimization



- The nominal A/B optimum weighting algorithm selects optimal weights based on detector noise characteristics (NEDT, non-gaussian, popping).
- The nominal algorithm identified 241 channels which could be improved by changing weights.
- This list was reviewed in detail, and a table incorporating 171 changes to evaluate improvements was tested on Oct. 9, 2011.



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G&C Table A/B Optimization (2)

- With feedback from Strow (championing conservatism) and Hannon (promoting changes resulting in NEDTs < 0.25K), a table with 100 changes for improvements was developed.
- Table load effective on 1/21/12

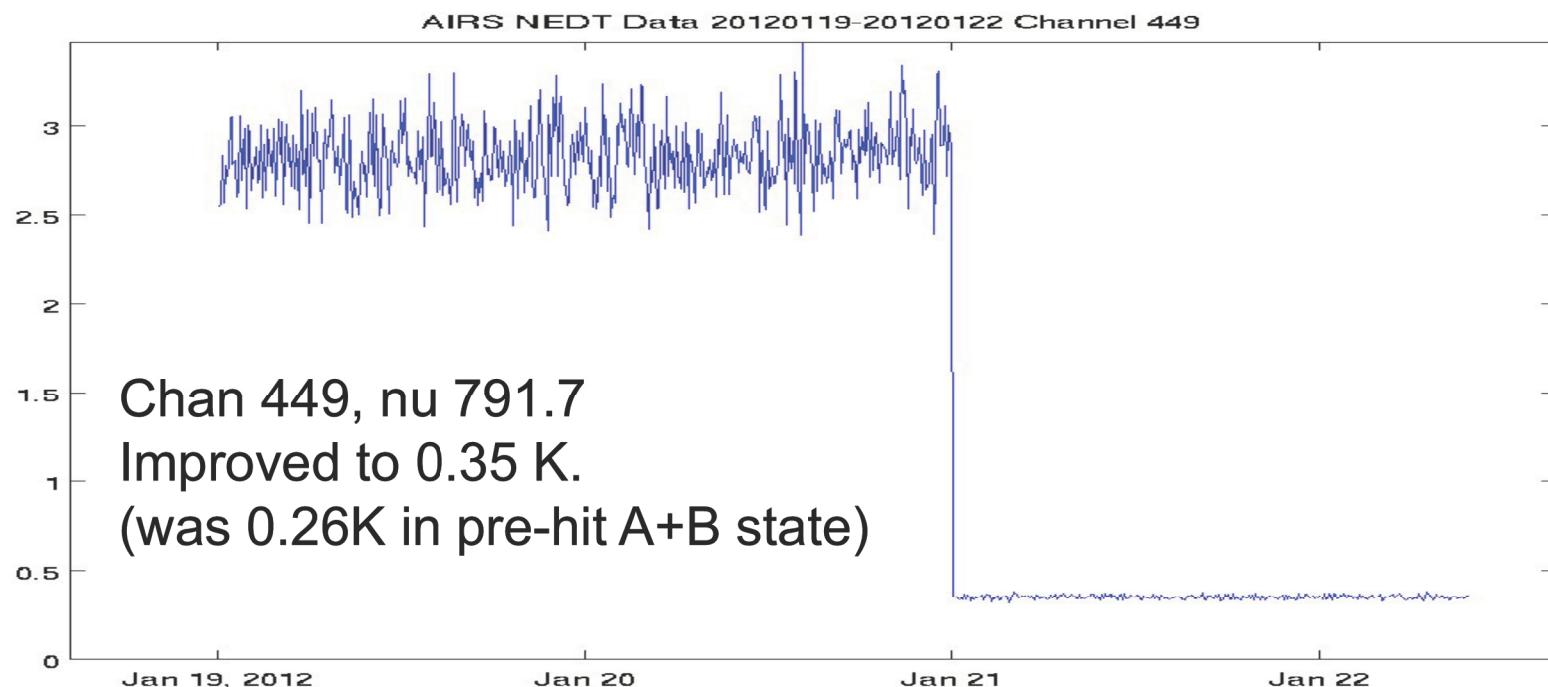




Table Load Results



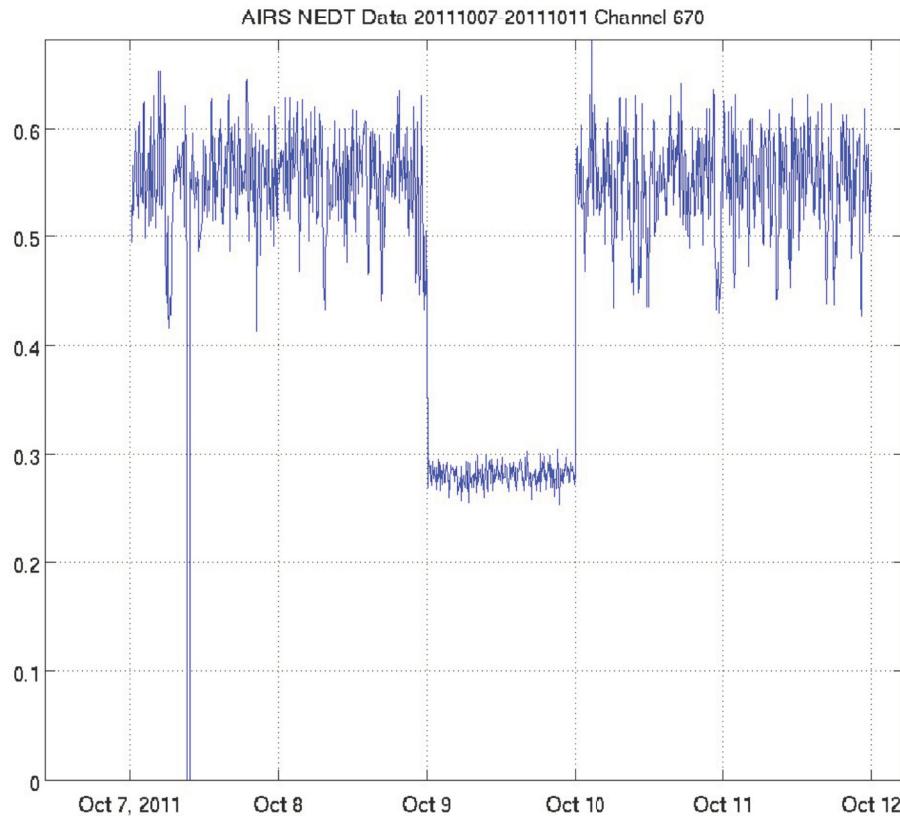
- Of these 100 channels changed for improvement...
 - 18 were switched from dead to live detectors
 - 13 had noise > 2K reduced to < 1K
 - 24 had noise > 1K reduced to < 0.9K
 - 25 had noise < 1K reduced by a factor of > 2
 - 11 had noise < 1K reduced by a factor >1 (but < 2)
 - ~ half had a reduction in non-gaussian noise (spiking)
 - 7 were “trades”
 - 6 higher NEDT for less spiking (intended)
 - 2 lower NEDT, but at the expense of more spiking (unintended)
 - 2 “other” (same NEDT, no spikes or reduced spread)
- Median improvement 0.6K, or factor of 2.8X



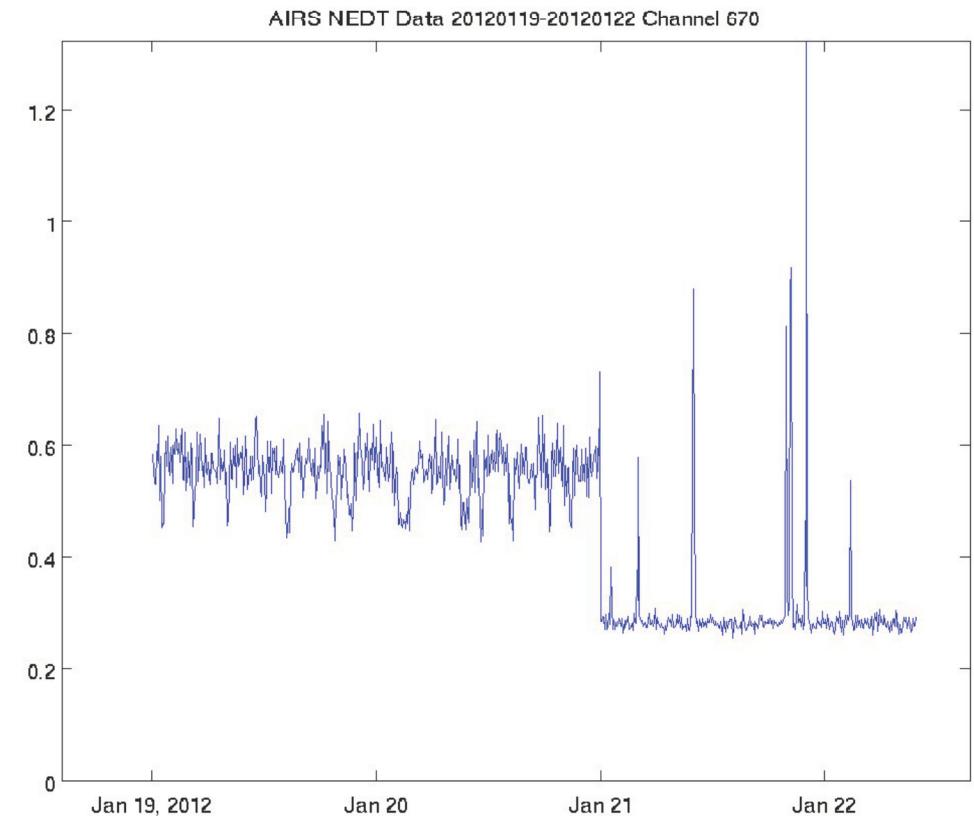
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Channel 670 (unintended trade)



Oct. 9 2011 test



Jan. 21 2012 table load

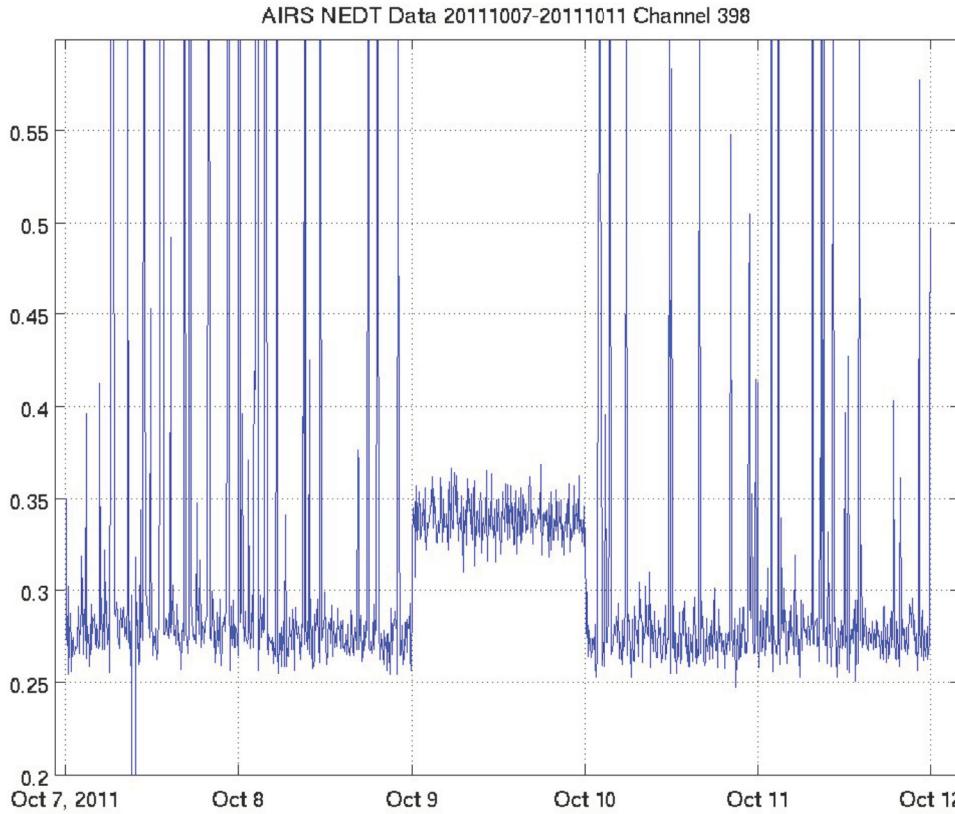


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Channel 398, not changed



- Aumann has proposed a simple metric to identify/flag non-stationary noise:
- $X = (\max(\text{nen}) - \min(\text{nen})) / \text{median}(\text{nen})$



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5 rad hits since table load

- Noise and pop flags are monitored by M. Weiler
- 5 rad hits have been observed since the table load on 1/21/12:
 - 1795 on 2/20/2012; .14K -> 0.25K, may be getting worse; A+B
 - 1163 on 3/14/12; .13K -> 0.35K variable; A+B
 - 634 on 3/29/12; 0.42K -> 0.7K variable; B side; A is 1.6K
 - 576 on 4/1/12; 0.4K -> 2-3K ; A side; B side 0.6K
 - 355 on 4/17/12; 0.325K -> .375K; A side; B > 0.6K (observed by ECMWF)

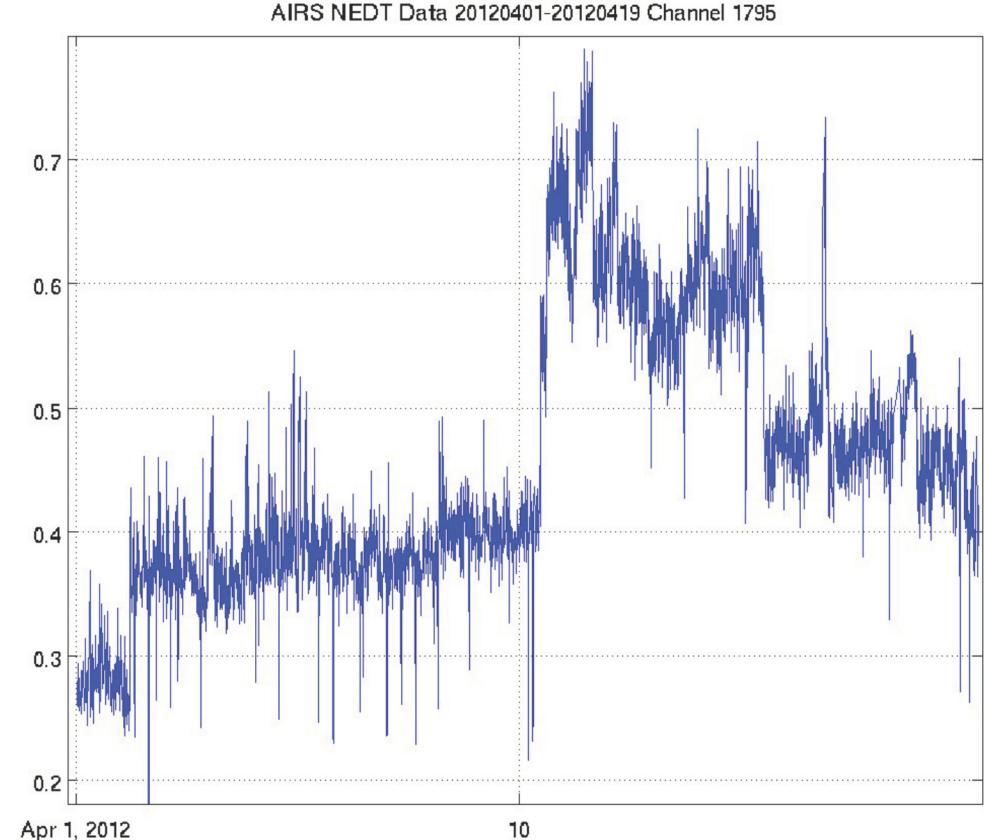
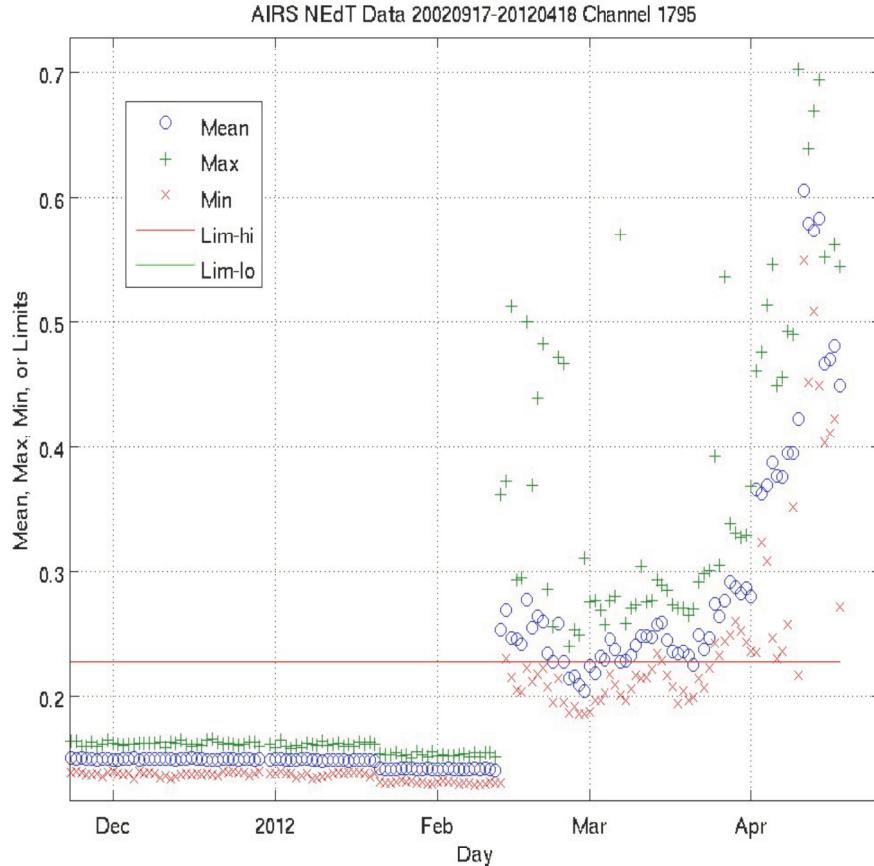


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Channel 1795 hit on 2/20/12



Daily Min, Mean, Max

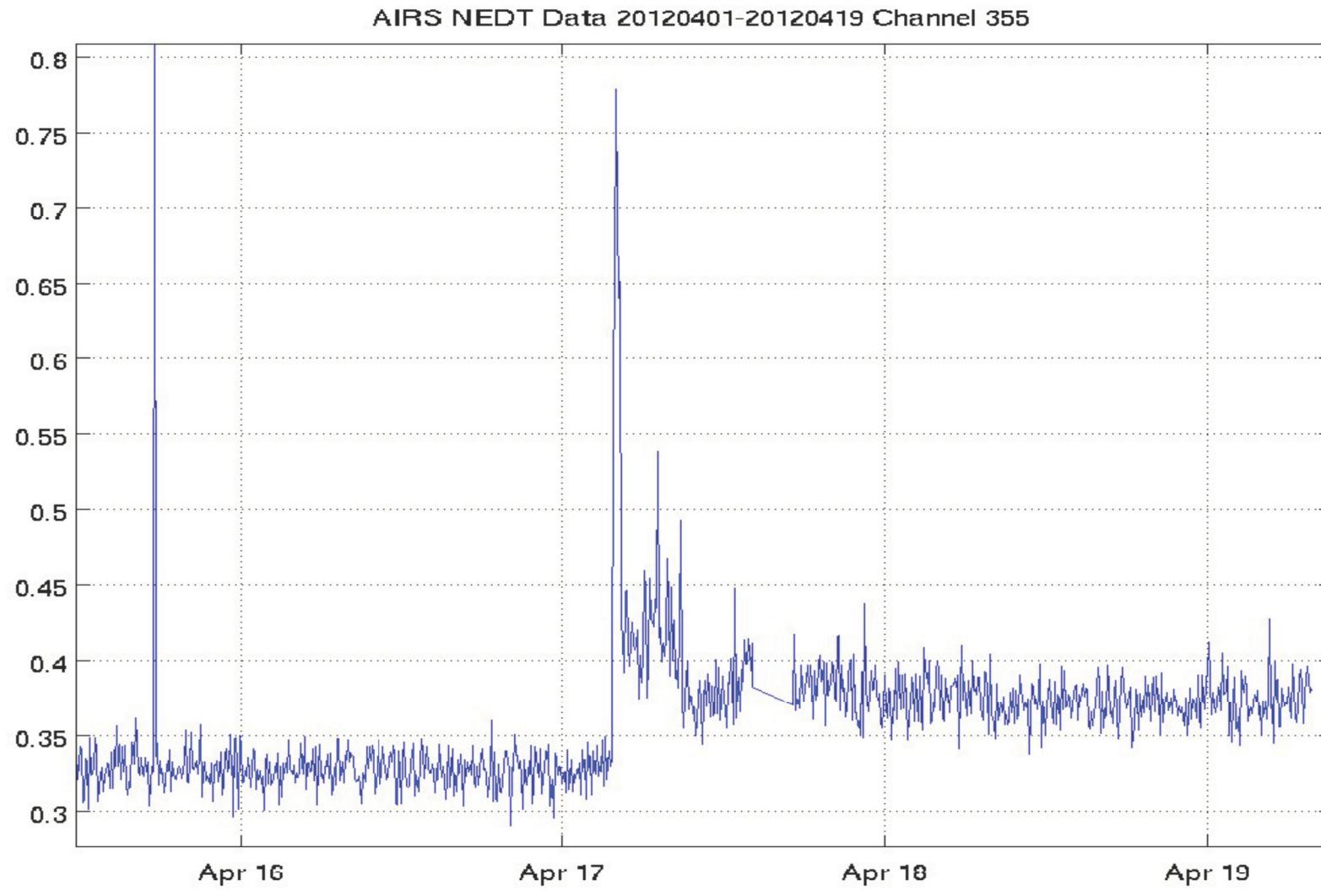
Granule resolution from 4/1 to 4/19



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Channel 355 hit on 4/17/12



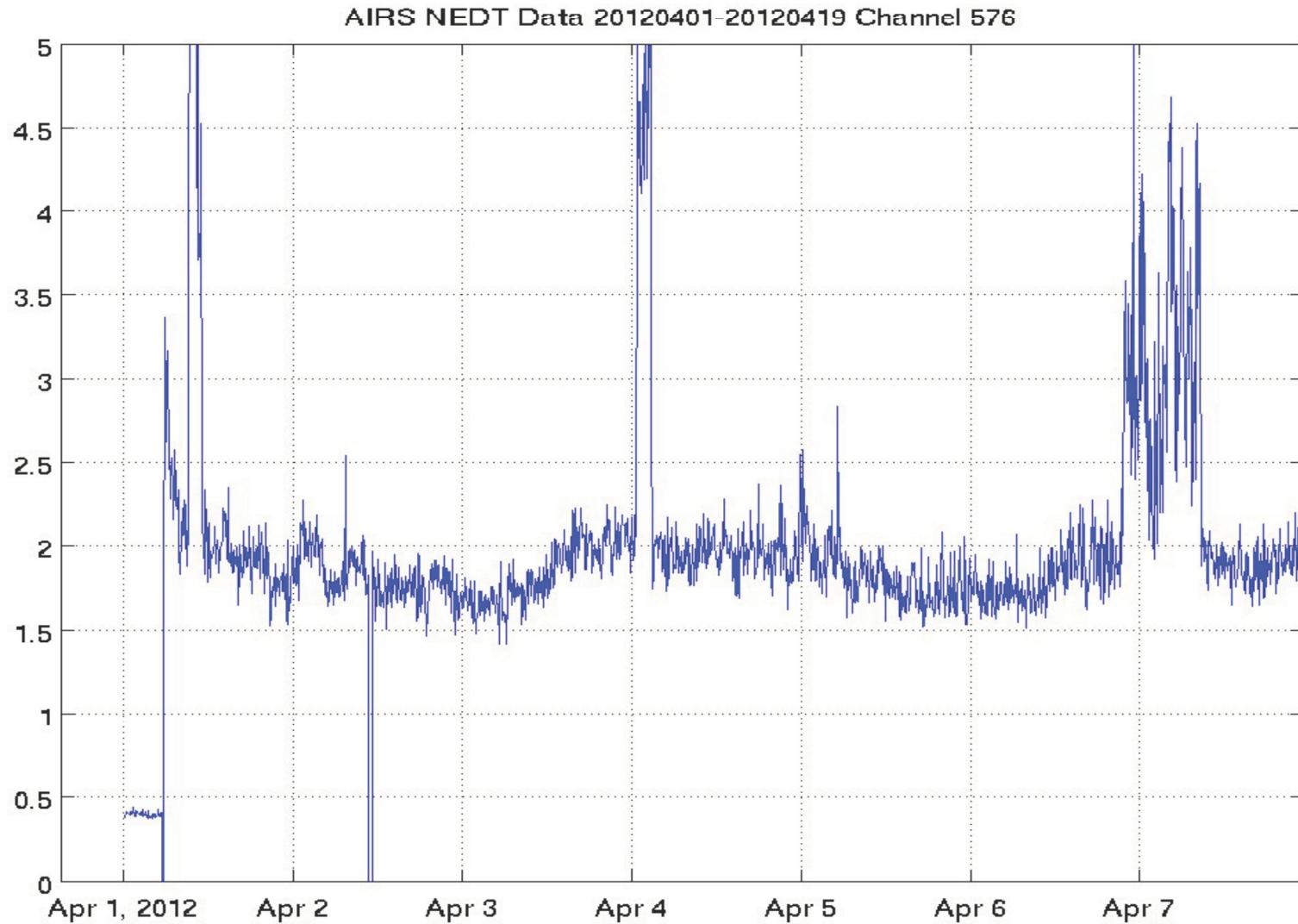


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Channel 576 hit on 4/1/12





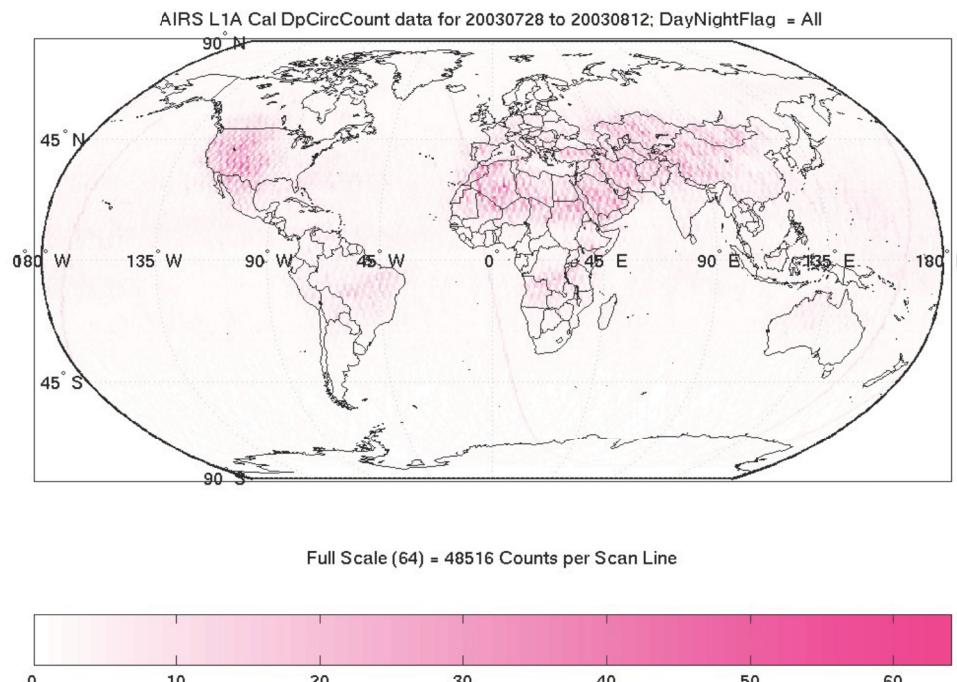
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G&C Table - Circumvention



- Radiation circumvention is enabled for the 724 short wave channels in modules 1-4. Of these, the thresholds for modules 1-2 are set too low (signal is being clipped for very warm scenes).



ADF 752,
M. Weiler



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Where do we go from here?



- Continue monitoring, update table as needed/desired
- Evaluate with greater emphasis on “gaussian-ness”.
- Consider updating circumvention thresholds - there is margin in the current circumvention threshold settings to allow for an increase, reducing clipping of signal in warm scenes for SW channels in modules 1 and 2.
- List of channels changed with update follows



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List of channels changed(1)

		11/18/2003		1/21/2012							
PGE ID	freq	weight	weight	PGE ID	changed	to	from	delta	old/new	comment	
277	728.66	A	B	277	improved	0.40	dead				
300	735.69	A+B	B	300	improved	0.35	1.60	-1.25	4.6		
302	736.308	A+B	B	302	improved	0.40	5.00	-4.60	12.5		
326	743.8	A	B	326	improved	1.2	10	-8.80	8.3		
345	749.839	A	B	345	improved	0.60	8.5	-7.90	14.2		
349	751.123	A+B	B	349	improved	0.35	0.9	-0.55	2.6		
386	763.205	A	B	386	improved	0.38	0.92	-0.54	2.4		
387	763.537	A+B	A	387	improved	0.29	1.35	-1.06	4.7		
404	769.221	B	A	404	improved	0.80	11	-10.20	13.8		
415	772.943	A	B	415	improved	0.90	1.6	-0.70	1.8		
444	789.971	A+B	B	444	improved	0.55	1.45	-0.90	2.6		
449	791.745	A+B	A	449	improved	0.35	2.8	-2.45	8.0		
451	792.457	A+B	A	451	improved	0.33	0.5	-0.17	1.5		
453	793.171	A+B	B	453	improved	0.40	1	-0.60	2.5		
461	796.036	A	B	461	improved	1.10	2.25	-1.15	2.0		
466	797.837	A	B	466	improved	0.50	1	-0.50	2.0		
476	801.463	A+B	A	476	improved	0.40	1	-0.60	2.5		
481	803.288	A+B	B	481	improved	0.40	4	-3.60	10.0		
526	820.072	A+B	A	526	improved	0.32	0.6	-0.28	1.9		
531	821.978	A	B	531	improved	2.10	7	-4.90	3.3		
542	826.202	A+B	B	542	improved	0.45	0.95	-0.50	2.1		
548	828.522	A+B	A	548	trade	1.90	1.65	0.25	0.9	from 1.6K with spikes to 1.8 with no spikes	
582	841.91	A	B	582	improved	1.05	7.6	-6.55	7.2		
583	842.31	B	A	583	improved	0.88	8	-7.12	9.1	.88, .78 variable	
588	844.315	A+B	A	588	improved	0.47	0.54	-0.07	1.1	B popped more	
600	849.163	A+B	A	600	improved	0.60	1.4	-0.80	2.3		
604	850.791	B	A	604	improved	1.10	1.1	0.00	1.0	spread tightened, mean bimodal (.95, 1.1K)	



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List of channels changed (2)

PGE ID		freq	weight	weight	PGE ID	changed	to	from	delta	old/new	comment
655		865.849	A+B	A	655	improved	0.35	0.9	-0.55	2.6	
666		869.36	A+B	A	666	improved	0.32	0.53	-0.21	1.7	
670		870.645	A	B	670	trade	0.28	0.55	-0.27	2.0	lower mean, but max ragged
699		880.08	A+B	A	699	improved	0.26	1.5	-1.24	5.8	
715		885.38	A+B	A	715	improved	0.24	1.75	-1.51	7.3	
733		891.424	A	B	733	improved	0.37	7.9	-7.53	21.4	
738		893.118	A+B	A	738	improved	0.22	1.1	-0.88	5.0	
742		894.479	A	B	742	improved	1.7	dead			
743		894.82	A	B	743	improved	0.36	dead			
747		896.185	A+B	B	747	no change - removed dead detector					
749		896.87	A+B	B	749	no change - removed dead detector					
753		898.243	A+B	B	753	no change - removed dead detector					
755		898.931	A	B	755	improved	0.45	dead			
756		899.275	B	A	756	improved	0.36	dead			
758		899.965	A+B	B	758	improved	0.18	0.43	-0.25	2.4	removed spikes as well
765		902.387	A	B	765	improved	0.55	dead			
783		915.87	B	A	783	improved	6.1	dead			
802		922.733	B	A	802	improved	0.28	3.4	-3.12	12.1	
831		933.414	B	A	831	improved	0.31	4.5	-4.19	14.5	
837		935.655	A	B	837	improved	4.6	dead			
842		937.532	A	B	842	improved	1.03	14	-12.97	13.6	
855		942.447	A	B	855	improved	0.13	2	-1.87	15.4	spikes added - but A side does not look gaussian either
860		944.352	A	B	860	improved	0.12	0.18	-0.06	1.5	spikes removed
864		945.881	A	B	864	improved	0.13	0.41	-0.28	3.2	
865		946.264	A	B	865	improved	0.31	1.04	-0.73	3.4	
867		947.031	A+B	B	867	no change - removed dead detector					
868		947.415	B	A	868	improved	0.25	1.06	-0.81	4.2	
875		950.113	A+B	B	875	no change - removed dead detector					



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List of channels changed (3)

PGE ID	freq	weight	weight	PGE ID	changed	to	from	delta	old/new	comment
884	953.604	A	B	884	improved	0.28	1.1	-0.82	3.9	
894	957.513	A+B	B	894	no change - removed dead detector					
900	959.874	A	B	900	improved	0.12	6	-5.88	50.0	
907	962.644	B	A	907	improved	2.8	dead			
919	967.431	A	B	919	improved	0.38	1.7	-1.32	4.5	noise a little hairy, but not worse than higher noise sta
928	971.052	A	B	928	improved	0.12	1.1	-0.98	9.2	
930	971.86	A	B	930	improved	0.2	5.3	-5.10	26.5	
941	975.446	A	B	941	improved	0.29	0.675	-0.39	2.3	
952	979.95	B	A	952	improved	0.26	1.6	-1.34	6.2	
954	980.774	A	B	954	improved	1.15	dead			
957	982.011	A	B	957	improved	0.42	dead			
996	998.387	A+B	A	996	improved	0.13	0.6	-0.47	4.6	
1031	1013.549	A+B	A	1031	improved	0.12	0.18	-0.06	1.5	lower, tighter, no spikes
1037	1016.193	A+B	B	1037	improved	0.11	0.41	-0.30	3.7	
1039	1017.078	A	B	1039	trade	0.24	0.14	0.10	0.6	trade -A side spikes 50%
1041	1017.964	A	B	1041	improved	0.16	0.7	-0.54	4.4	
1046	1020.185	A	B	1046	improved	0.16	0.9	-0.74	5.6	
1092	1041.077	A+B	A	1092	improved	0.16	0.16	0.00	1.0	reduced spiking
1105	1056.551	A	B	1105	improved	0.49	1.1	-0.61	2.2	
1125	1066.154	A	B	1125	improved	2.6	dead			
1126	1066.639	B	A	1126	trade	0.53	0.16	0.37	0.3	spiking removed
1129	1068.095	A	B	1129	improved	0.14	0.21	-0.07	1.5	
1132	1069.554	B	A	1132	improved	0.3	0.65	-0.35	2.2	
1140	1073.466	A+B	B	1140	improved	0.28	1.33	-1.05	4.8	
1148	1077.404	A	B	1148	improved	2	dead			
1173	1089.89	B	A	1173	improved	1.6	4.1	-2.50	2.6	
1193	1100.077	A+B	B	1193	no change - removed dead detector					
1197	1102.136	A	B	1197	improved	0.21	0.28	-0.07	1.3	spikes removed



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List of channels changed (4)

		11/18/2003		1/21/2012							
PGE ID	freq	weight	weight	PGE ID	changed	to	from	delta	old/new	comment	
1203	1105.238	A	B	1203	improved	2.4	dead				
1208	1107.835	A	B	1208	improved	2.9	dead				
1251	1130.655	A	B	1251	improved	0.33	0.6	-0.27	1.8	spikes removed	
1253	1131.738	A+B	B	1253	trade	0.32	0.23	0.09	0.7	spiking removed	
1255	1132.822	A	B	1255	trade	0.28	0.55	-0.27	2.0	lower mean, but noise very irregular	
1354	1264.886	A	B	1354	improved	0.22	1.1	-0.88	5.0		
1355	1265.433	A	B	1355	improved	0.29	16.7	-16.41	57.6		
1380	1290.571	A	B	1380	improved	0.12	0.73	-0.61	6.1	multimode - .12, .14, 18	
1579	1399.918	A+B	A	1579	trade	0.14	0.09	0.05	0.6	spiking removed	
1690	1481.86	B	B	1690	improved	0.1	0.3	-0.20	3.0		
1712	1495.762	A	B	1712	improved	0.17	0.61	-0.44	3.6		
1728	1506.035	B	A	1728	improved	0.36	dead				
1731	1507.977	B	A	1731	improved	3.1	dead				
1790	1560.934	B	A	1790	improved	0.17	0.35	-0.18	2.1		
1802	1569.288	B	A	1802	improved	0.24	dead				multimode .24, .4
1828	1587.688	A+B	A	1828	improved	0.22	0.34	-0.12	1.5		
1842	1597.769	A	B	1842	improved	0.6	3.8	-3.20	6.3		
1855	1607.241	A+B	A	1855	improved	0.5	1	-0.50	2.0		
1920	2232.429	A+B	B	1920	improved	0.15	0.37	-0.22	2.5		
1937	2248.647	A+B	A	1937	improved	0.2	0.95	-0.75	4.8		
2173	2475.2	A+B	B	2173	improved	0.26	0.46	-0.20	1.8		
2177	2479.399	A+B	B	2177	improved	0.28	0.65	-0.37	2.3		
2288	2569.315	A+B	A	2288	improved	0.44	1	-0.56	2.3		
2357	2642.213	A+B	A	2357	improved	0.53	15	-14.47	28.3		